DETAILS OF THE WEATHER IN THE UNITED STATES

GENERAL CONDITIONS

By ALFRED J. HENRY

The outstanding feature of the month was the mild temperatures experienced in practically all parts of the country (Chart IV). Naturally there was an absence of general cold waves. This condition was probably due, in great part, to the presence of great barometric depressions centered over the Gulf of Alaska and the northeastern Pacific from which offshoots were discharged at fairly regular intervals throughout the month. There was also an unusual number of secondary cyclonic disturbances which for the most part originated east of the Rocky Mountains in southeastern Wyoming. Some of these moved toward the southeast and then to the northeast and two of them had a short life. Pressure in the North Pacific HIGH was but 30.18 inches; the North Atlantic HIGH was however, well developed on both sides of that ocean. The usual details follow.

CYCLONES AND ANTICYCLONES

By W. P. DAY

The month began with a series of LOWS passing through the Aleutian Islands, the Gulf of Alaska, British Columbia, and along the northern border, a condition continuing until the 9th, when rising pressure over the interior of Alaska and the Canadian Northwest caused a deflection of the LOWS into lower latitudes. The latter condition continued until the end of the month, with generally high pressure over the interior of Canada and a succession of high-pressure areas from that region. However, these moving HIGHS, with the exception of the one which appeared over Alberta on the 25th, did not produce any marked changes to colder. With one or two exceptions the low-pressure areas passing across the United States were not important as storms, but their great frequency associated with the numerous HIGHS caused rapid fluctuations in temperature in north-central districts during the second and third decades of the month.

FREE-AIR SUMMARY

By V. E. JAKL

Free-air temperatures were above normal over all aerological stations, and the departures moreover were generally quite uniform with altitude. (See Table 1). Therefore Chart III, this REVIEW, giving surface departures, represents the free-air departures as well. Pronounced inversion in temperature were not so frequent as in the preceding winter months, yet a few instances of decided inversion were recorded during the first few days. The kite flights at Ellendale furnished an example on the 2d of an inversion that, for steepness of the inverted gradient, probably exceeds, or at any rate equals, any heretofore recorded at that station. On this date, the morning surface-minimum temperature was −28.9° C.; at 900 meters above the ground the temperature at 8 a. m. was 0.4° C., and at 3,900 meters above the ground the temperature at 9:30 a. m. was −13.1° C. The circumstance of pressure, wind direction, etc., inducing this temperature gradient was typical of the conditions attending recovery of temperature after a cold wave, as brought out in the Free-Air Summary for January, 1925.

It was shown in the Free-Air Summary for December, 1924, that cold waves were often observed to begin in the lower levels and then gradually extend to higher altitudes, the building-up process sometimes taking a number of days. On the other hand, the change to colder sometimes seems to occur almost simultaneously above and below, and again a change to decidedly colder aloft may be accompanied by no change or a retarded change in the levels near the ground. Illustrations of a few of the diverse vertical temperature gradients accompanying changes to colder are given in the following extracts from the records of Broken Arrow, and Ellendale, in which each column shows the temperature in the free air after a change to colder from the day before. At Broken Arrow the change on the 2d was most pronounced in the lower levels, and on the 25th in the upper levels, and similarly at Ellendale on the 1st and 26th respectively.

Broken Arrow, Okla. (altitude, 233 meters, m. s. l.)

Feb. 2, 1925			Feb. 25, 1925		
Altitude, m. s. l. (meters)	Temperature	Wind direction	Altitude, m. s. l. (meters)	Temperature	Wind direction
	° C.			° C.	
Surface	−8.0	N.	Surface	6.7	NNW.
668	−11.8	NNE.	519	8.6	NNE.
1,152	2.9	NNE.	975	8.4	N.
3,308	−7.5	NNE.	2,161	−2.7	NNW.
3,807	−4.5	NNE.	2,913	−10.6	NNW.
4,302	−7.6	N.	3,636	−16.4	NW.

Ellendale, N. Dak. (altitude, 444 meters, m. s. l.)

Feb. 1, 1925			Feb. 26, 1925		
Altitude, m. s. l. (meters)	Temperature	Wind direction	Altitude, m. s. l. (meters)	Temperature	Wind direction
	° C.			° C.	
Surface	−22.6	N.	Surface	−21.2	NW.
669	−24.9	N.	1,159	−26.8	NW.
1,817	−17.9	NNW.	1,777	−22.7	NNW.
2,474	−7.9	NW.	2,404	−21.0	NNW.
			2,821	−22.5	NNW.

It is of interest to note to what extent these different types of temperature changes are distinguished by definite types of weather maps. As an approach to an approximate classification, it may be said that when a HIGH is being gradually reinforced, the "building up" process continues until the isobars are closed on the north, after which a change to warmer undoubtedly begins—probably in the upper levels first. If a "closed" HIGH passes over a station, it is a common fact of observation that the lowest temperature will not extend above some moderate altitude, say 1,000 to 2,000 meters. If a well-defined LOW with long isobars in its rear extending far to the north precedes the HIGH, there will be a strong drainage from a northerly direction to a great depth and over considerable territory, and the change to colder will occur simultaneously aloft and below, or more rapidly aloft than below, according to the various characteristics of the HIGH and the position of the place of observation relative to the pressure trough and crest. As the identity of these different types is of course not always well defined, a clue to the vertical temperature gradient may sometimes be had by considering the probable sources of air at the different levels, in connection with the various pressure and temperature features of the surface weather map.

Wind resultants for the month, deduced from kite and pilot-balloon observations, showed a fairly close agreement with the normal, i. e., winds of moderate force varying somewhat between south and west near the ground, but tending steadily to become strong winds from nearly due west in the higher levels. (See Table 2). However, a slight deviation of the resultant wind from normal (less northerly component in the upper